(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: 0 555 869 A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 93102242.0

(51) Int. Cl.5: H04B 3/54

(22) Date of filing: 12.02.93

(30) Priority: 14.02.92 JP 28233/92

(43) Date of publication of application:
18.08.93 Bulletin 93/33

(84) Designated Contracting States:
DE FR GB

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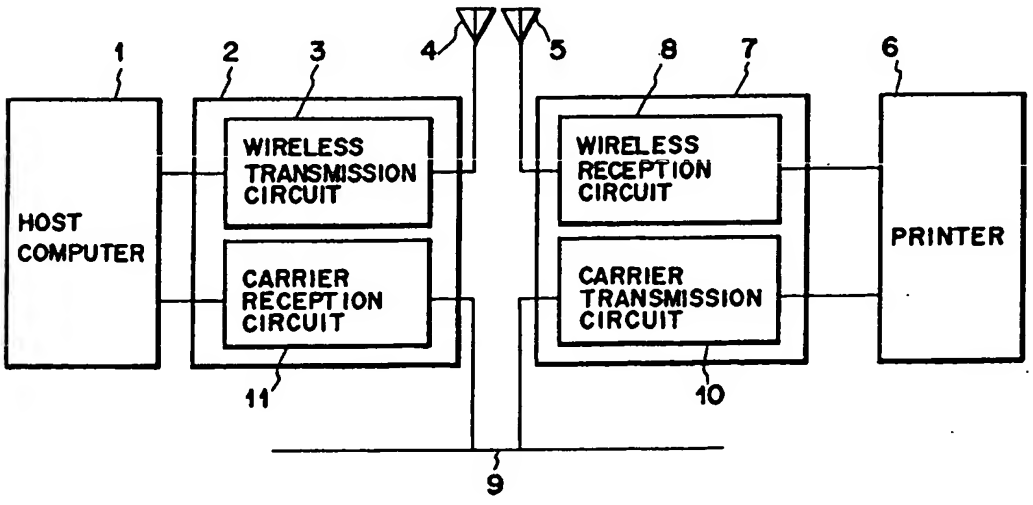
(54) High rate/low rate bidirectional data transmission apparatus.

(57) Full duplex communication is attained by using only one communication channel in wireless communication between a host computer 1 and a printer 6. The communication from the host computer 1 to the printer 6 is effected by wireless, and the communication from the printer 6 to the host computer 1 which includes a small amount of information is effected through a power line 9.

FIG.1



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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a wireless communication apparatus and, more particularly, to a communication apparatus for data communication for in-house use, office automation or the like.

Related Background Art

In the past, wireless data communication for in-house use has been done in Japan by using a small power wireless apparatus. In such data communication, a communication circuit added to each data terminal has a transceiver. When such a transceiver is used for full duplex communication, electromagnetic waves (channels) of different frequencies for the respective directions of communication are required.

The foregoing bands of electromagnetic waves available to the communication are now short. Nevertheless, in the prior art, two channels are always occupied without regard to the amount of information to be communicated.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a communication apparatus which solves the above problem and can save the channels with a simple construction. According to the present invention, in case where there is a difference in the amount of information depending on the direction of communication such as communication between a host computer and a printer, wireless communication is used for communication direction of larger amount of information to be communicated, a power line is used and an electric line carrier communication circuit is added for the communication for the other direction so that the full duplex communication is attained by occupying only one channel.

The reason for preferably using the electric light line carrier communication for the communication of the direction of less communication information amount is that it is not permitted by a legal regulation to superimpose a signal of a broad frequency band on the power line and hence it does not fit to the transmission of large amount of information.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a block diagram of a configuration of a first embodiment of the present invention, and

Fig. 2 shows a block diagram of a configuration of a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 shows a first embodiment of the present invention. In Fig. I, numeral 1 denotes a host computer (for example, a personal computer), numeral 2 denotes a communication apparatus which is connected to the host computer 1, numeral 3 denotes a wireless transmission circuit of the communication apparatus 2, numeral 4 denotes a transmission antenna, numeral 5 denotes a receiving antenna, numeral 6 denotes a printer, numeral 7 denotes a communication apparatus which is connected to the printer, numeral 8 denotes a wireless receiver circuit of the communication apparatus 7, numeral 9 denotes a commercial power line from which the computer 1, the communication apparatus 2, the printer 6 and the communication apparatus 7 are powered, numeral 10 denotes an electric light line carrier transmission circuit of the communication apparatus 7, and numeral 11 denotes an electric light line carrier receiving circuit of the communication apparatus 2.

In the present embodiment, the amount of information required between the computer 1 and the printer 6 is much larger in the direction from the computer 1 to the printer 6 (hereinafter referred to as a down line) than in the opposite direction (hereinafter referred to as an up line). Namely, a large amount of information such as character information and image information to be printed out flows over the down line while a relatively small amount of information such as a handshake signal at the start of the communication and a retransmission request (ARQ) or the like when an error occurs in the course of communication flows over the up line.

In Fig. 1, the relatively large amount of information sent out of the computer 1 is transmitted to the printer 6 through the down line, namely the wireless transmission circuit 3. the antenna 4, the antenna 5 and the wireless receiver circuit 8.

On the other hand, the relatively small amount of information sent out of the printer 6 is transmitted to the computer 1 through the up line, that is, the electric light line carrier transmission circuit 10, the commercial power line 9 and th electric light line carrier receiver circuit 11.

When there is a difference in the amounts of the information between the up line and the down line, the wireless communication is allocated to the communication of the larger information amount and the power line carrier communication is allocated to the communication of the smaller in-

formation amount so that only one wireless channel is used and a valuable resource of electric wave is saved.

In the present embodiment, it is assumed that the information amount of the down line is larger than that of the up line. In the opposite case, the complementary measure of exchanging the communication apparatuses 2 and 7 may be taken.

Fig. 2 show a second embodiment of the present invention.

Those elements which are duplicate of the elements of the first embodiment are designated by the same numerals and the explanation thereof is omitted.

In Fig. 2, numerals 21 and 24 denote double-throw switching circuits, numerals 22 and 23 denote wireless communication transceiver circuits, and numerals 25 and 26 denote electric light line carrier communication transceiver circuits.

In the present embodiment, the transceiver circuit 22 is used in place of the wireless transmission circuit of the first embodiment, the transceiver circuit 23 is used in place of the wireless receiver circuit, the electric light line carrier transceiver circuit 26 is used in place of the power line carrier transmission circuit, and the electric light line carrier transceiver circuit 25 is used in place of the electric light line receiver circuit. The double-pole double-throw switching circuit 21 is provided between the computer 1 and the communication apparatus 2 and the double-pole double-throw switching circuit 24 is provided between the communication apparatus 7 and the printer 6 so that the up line and the down line can be switched to either the wireless communication or the electric light line carrier communication.

In the present embodiment, if the amounts of information of the up line and the down line are reversed, the double-pole double-throw switches are switched to cope therewith.

The double-pole double-throw switching circuits 21 and 24 are not limited to the mechanical contacts as shown but they may be of electric circuit type.

The switching may be made automatically in response to automatic information amount detection means (not shown).

In the in-house wireless data communication, the electric light line carrier communication is additionally used, and the wireless communication is used for the line of the larger information amount among the up line and the down line and the electric light line carrier communication is used for the line of the smaller information amount. As a result, the number of channels of the electric wave can be reduced to one half.

Full duplex communication is attained by using only one communication channel in wireless communication between a host computer 1 and a printer 6. The communication from the host computer 1 to the printer 6 is effected by wireless, and the communication from the printer 6 to the host computer 1 which includes a small amount of information is effected through a power line 9.

Claims

1. A bidirectional communication apparatus powered from a power line characterized in that communication in one direction is effected by wireless and communication in the other direction is effected through said power line.

2. A communication apparatus according to Claim 1 further comprising means for selecting the direction for the wireless communication.

3. A communication apparatus according to Claim 1 wherein the bilateral communication with different amounts of information to be communicated depending on the direction of communication is effected.

4. A communication apparatus according to Claim 2 wherein the bilateral communication with different amounts of information to be communicated depending on the direction of communication is effected.

5. A communication apparatus comprising:
   means for wireless transmitting print data from a computer; and
   means for receiving information superimposed on a power line.

6. A communication apparatus comprising:
   means for receiving print data transmitted by wireless; and
   means for superimposing a signal to be sent from a printer to a computer onto a power line.

FIG. 1

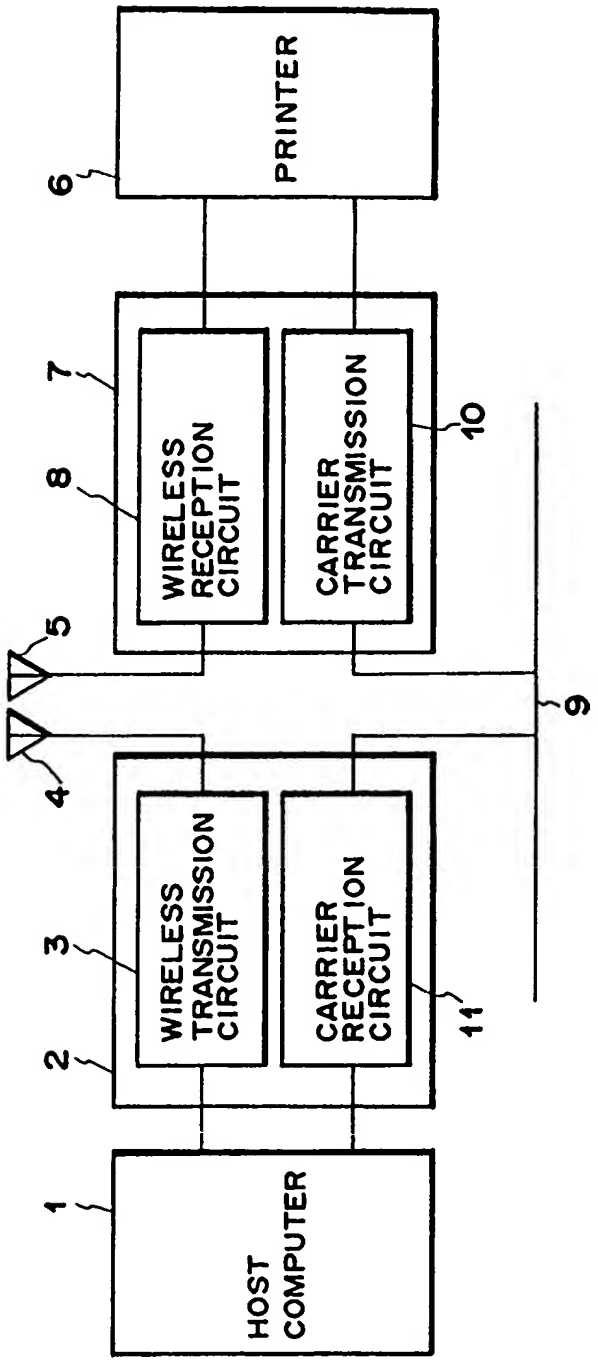
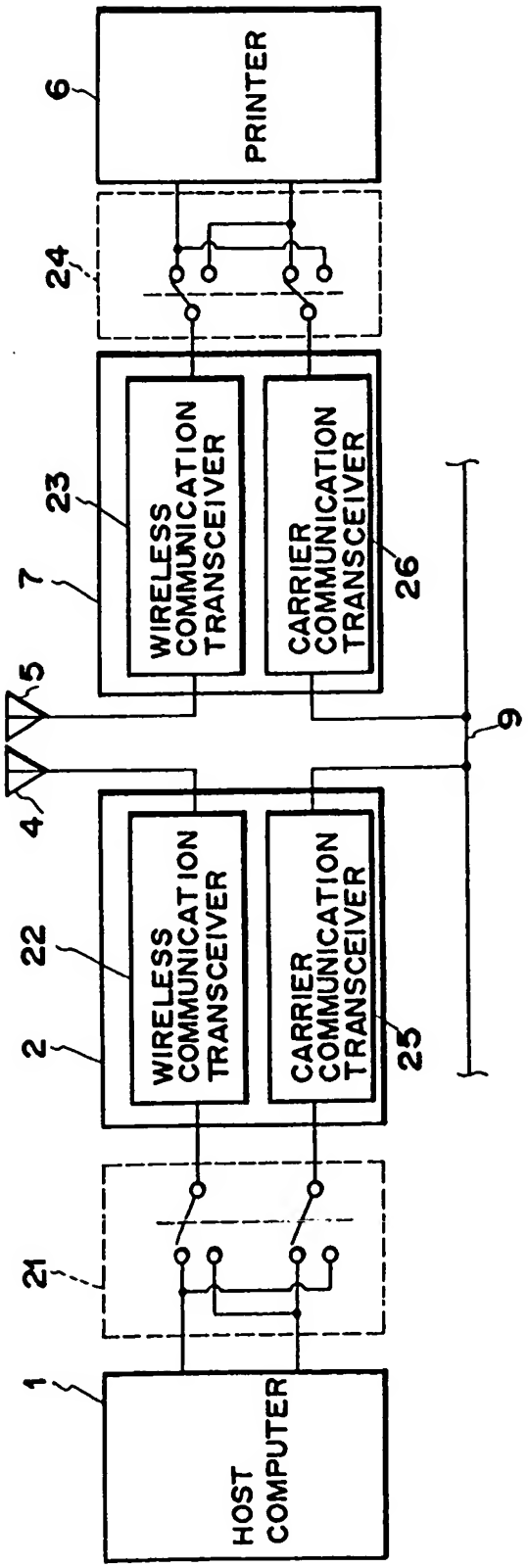

HOST COMPUTER
1
WIRELESS TRANSMISSION CIRCUIT
2
3
CARRIER RECEPTION CIRCUIT
11
4
5
9
WIRELESS RECEPTION CIRCUIT
7
8
CARRIER TRANSMISSION CIRCUIT
10
PRINTER
6

FIG.2


PRINTER
6
24
WIRELESS COMMUNICATION TRANSCEIVER
23
CARRIER COMMUNICATION TRANSCEIVER
26
7
5
9
4
WIRELESS COMMUNICATION TRANSCEIVER
22
CARRIER COMMUNICATION TRANSCEIVER
25
2
21
1
HOST COMPUTER